

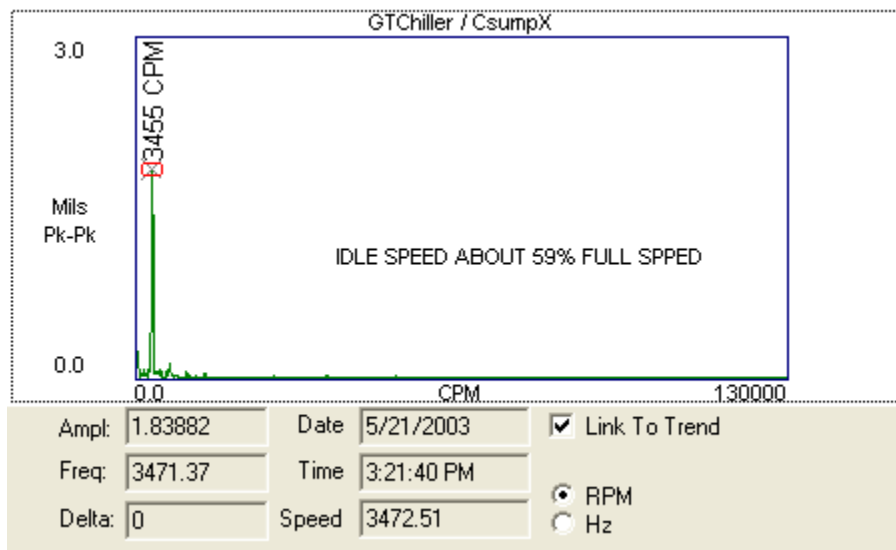
MachineryWatch.Com, Inc. Case History

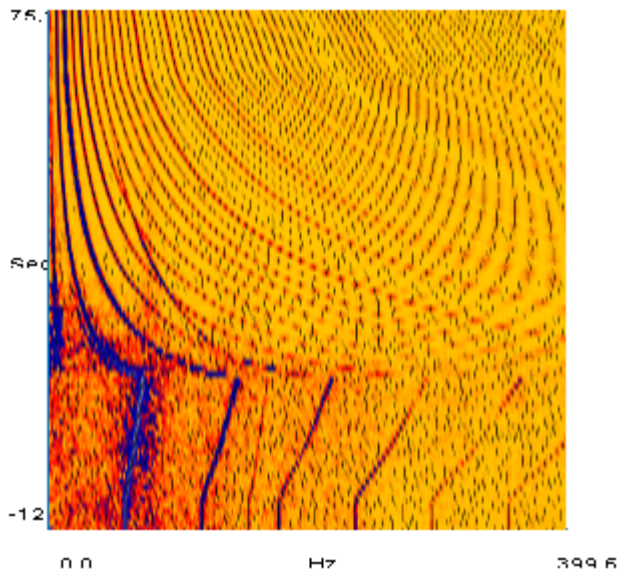
Machine: Large Propylene Process Refrigeration Compressor
Industry & Location: PetroChemical, Louisiana
Equipment: Gas Turbine Driven, 5 Stage Centrifugal Compressor
Power Turbine and Compressor Speed = 5,700 RPM
Instrumentation: MAARS Model 5000, factory installed proximity probes
Condition: Rotor Bow from Inter-stage Seal Rub
Indication: Failure to Achieve Operating Speed, Trip When Passing Critical Speed, Excessive 1X Amplitudes on all Probes
Corrective Action: Compressor Disassembled, All components dynamically balanced above critical speed, Spacers between wheels modified to prevent creation and retention of bow due to rub-induced thermal bow

The compressor manufacturer requested assistance in data acquisition and analysis initially due to failure of the compressor to achieve design performance at installation. Initial compressor wheel designs were found to be improper for the installation so a new rotor was provided with different compressor wheels. The new compressor initially started, but had excessive vibration when passing through the critical speed.

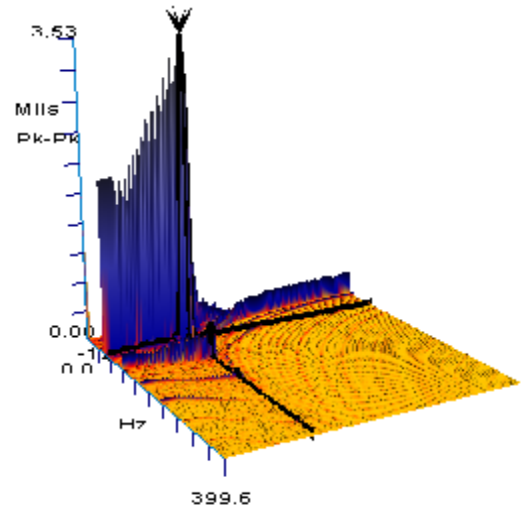
The problem got worse with each successive start of the machine so that soon even when idling at about 50% of design RPM the vibration level approached the manufacturer's recommended alarm levels. The orbits did not indicate on-going rub conditions.

The spectral data all indicated that the controlling frequency at all probes was 1X RPM. Evidence of the rub of the interstage seal was discovered as the machine was disassembled and a careful review of the clearance measurements made during assembly indicated that a below

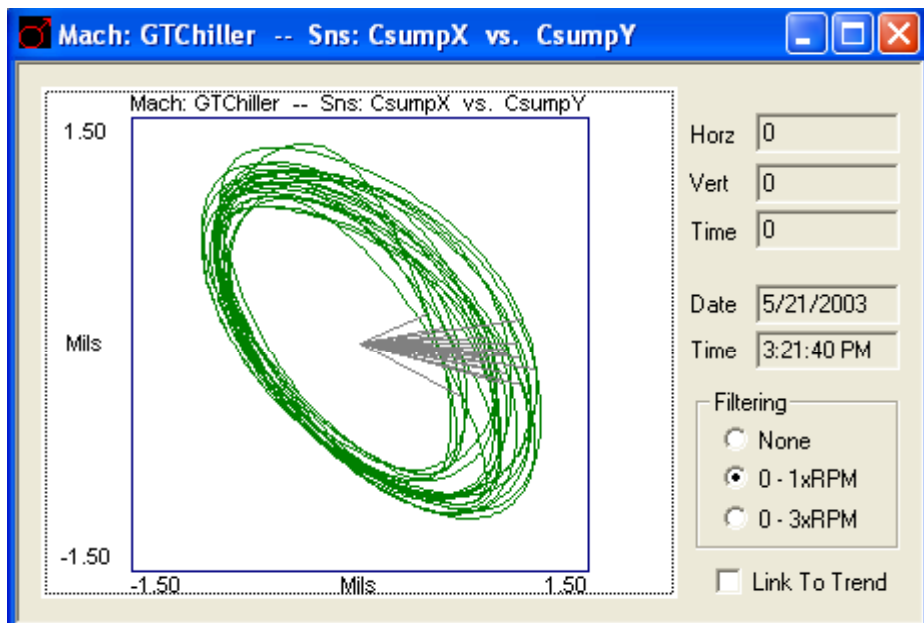


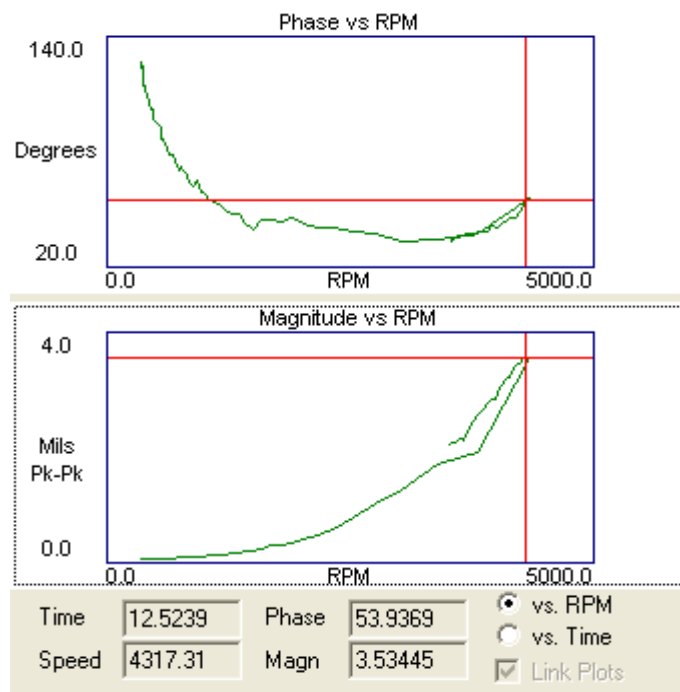


Time: 12.0235 Sec Speed: 4299.36 RPM Spectrum
 Freq: 71.9297 Hz Ampl: 3.5331 Mils Waveform
 Rotate Plot Move Cursor Trend



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 Freq: 71.9297 Hz Ampl: 3.5331 Mils Waveform
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minimum clearance was overlooked during assembly.

After the high speed dynamic balance on a balance stand in Houston, the unit was reassembled and levels were well within the compressor manufacturer's recommendations.

